

## FORT COLLINS SCIENCE CENTER SPECIES AND HABITATS OF FEDERAL INTEREST

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### CAPABILITIES

Ecosystem changes directly impact a wide variety of individual plant and animal species, native floral and faunal communities, and groups of species such as amphibians and grassland birds. Many species are dependent on suitable management of public lands for recovery from endangered status or to prevent listing under the Endangered Species Act. The Species and Habitats of Federal Interest Program of the Fort Collins Science Center (FORT) conducts research on the ecology, habitat requirements, distribution and abundance, and genetics and systematics of many such species.

FORT scientists also develop reintroduction and restoration techniques, as well as technologies for monitoring populations and analyzing data. FORT expertise lies in both traditional and specialized natural resource disciplines, including wildlife biology, population dynamics, animal behavior, plant and community ecology, inventory and monitoring, statistics and computer applications, conservation genetics, stable isotope analysis, and museum curation.



### SELECTED PROJECTS



**Ecology of Prairie Dogs and Black-footed Ferrets.** Early research in the black-footed ferret recovery program focused on the ecology of a remnant free-ranging population of ferrets in Wyoming, emergency rescue of ferrets for captive breeding, refining methods of captive propagation, and developing the process of reintroducing ferrets back into their native prairie dog habitats. More recently, FORT scientists and collaborators have developed methods to evaluate and compare habitat for reintroductions, assisted in developing a canine distemper vaccine for captive and wild ferrets, and pioneered a new strategy

for rearing ferrets that has resulted in a 10-fold increase in post-release survival. Current research emphasizes the ecology and management of plague, a disease that threatens prairie dogs and ferrets. Scientists have found improved methods for controlling fleas on prairie dogs, which should reduce the probability of plague outbreaks. Studies recently initiated on translocations of the threatened Utah prairie dog have resulted in a 50-fold increase in short-term retention of prairie dogs at release sites.

**Declining Amphibians in Colorado and Wyoming.** Amphibian populations are declining worldwide. Locally, declines in populations of boreal toads in Rocky Mountain National Park have caused concern among park managers. FORT scientists are investigating the habitat use and population dynamics of



resident boreal toads as well as measures of amphibian health and possible disease influences. Nationally, FORT represents the Southern Rocky Mountains in the Department of the Interior's (DOI) Amphibian Research and Monitoring Initiative (ARMI), the largest program focused on amphibian decline to be funded by Congress. ARMI concentrates efforts on long-term monitoring and specific research questions relating to amphibian declines. FORT scientists work with DOI agencies to design and implement monitoring programs to ensure that data collected can be used effectively in management decisions and provide input into the broader scale, national scope of ARMI.

#### **Ecology of Virus Transmission in Commensal Bat Colonies.**

In 2001, FORT scientists joined with Colorado State University and the Centers for Disease Control and Prevention to conduct a bat study in the city of Fort Collins. This study aims to better understand the population dynamics of bats in urban-suburban areas, how bats interact with people and human structures, and how they transmit viruses to one another. The study focuses on the big brown bat, a species that commonly roosts in homes, buildings, cracks in trees, and other sites throughout the U.S.



**Stable Isotopes: Providing Answers to Ecological Questions.** Stable isotopes of various chemical elements occur naturally in all ecological systems. The power of stable isotopes in ecological studies hinges on two important traits. First, when an animal ingests water and food, its body tissues take on chemical “signatures” of the geographic area where it resides. Second, the chemical signature of natural environments varies across the surface of the earth. Taking advantage of these traits, FORT scientists are investigating the possibility that isotopic analyses of an animal's tissues (e.g., fur, feathers) may indicate the location of its breeding and non-breeding habitat, tell a more complete story about its migration patterns, or help to establish its feeding ecology and links to other components of the ecosystem.

**Prairie Birds: Declining Populations and Disappearing Habitats.** FORT scientists are developing and applying innovative approaches and the latest research technologies to studies of the demography, migratory movements, foraging ecology, behavior, and conservation of avian species in the mountain-prairie region of the U.S. These approaches include stable isotope analysis, genetic tools, radio-



telemetry, and geographic information systems (GIS). For example, FORT scientists are studying population dynamics and causes of decline in two endemic avian species of the short-grass prairie ecosystem, the Mountain Plover and Lark Bunting. In a study on migratory movements and ecology of shorebirds that traverse the continental interior, FORT staff are helping to develop a hemispheric shorebird monitoring program, developing models for habitat restoration and conservation planning, and evaluating the effects of weather cycles and global climate change on habitat availability and landscape connectivity.

**Rocky Mountain Center for Conservation Genetics and Systematics.** The Rocky Mountain Center for Conservation Genetics and Systematics was initiated as the result of a collaborative effort between FORT and the University of Denver. Genetic techniques can be used to augment studies of population dynamics and population viability, refine taxonomic definitions, investigate gene flow, and document genetic diversity. Ongoing studies at the Center include population genetics studies of rare and declining species such as the Greater Sage Grouse, Gunnison Sage Grouse, Trumpeter Swan, Mountain Plover, Lesser Prairie Chicken, Midget Faded Rattlesnake, and the rare plant taxon, *Potentilla rupincola*.



**Curation of the Biological Survey Collection.** FORT scientists manage and curate a valuable collection of vertebrates that belongs to USGS and its predecessor agencies. Located in the Museum of Southwestern Biology on the University of New Mexico campus, the collection is particularly rich in specimens of bats and rodents from western Federal lands and includes a unique collection of fishes from the Upper Colorado River Basin. The collection supports ongoing research that focuses on the status and distribution of listed species and species of special management concern in the Southwest. All specimen records are fully computerized and the mammal records are searchable online. Future plans include georeferencing all specimen records.

## STAFF

### ***Science Director: Patty Stevens***

M.S. Supervisory Wildlife Biologist: Science program management and administration.

Baker, Bruce W., Ph.D. Research Wildlife Biologist: riparian ecosystems, prairie dog ecosystems, avian ecology, beaver ecology.

Biggins, Dean, Ph.D. Research Wildlife Biologist: mustelid ecology, radio-telemetry, steppe ecosystems in North America and China.

Bogan, Michael, Ph.D. Research Wildlife Biologist: mammals, vespertilionid bats, systematics, curation.

Cade, Brian, Ph.D. Statistician (Biology): computer applications, statistics, regression quantiles, permutation procedures, wildlife-habitat relations, bird migration.

Child, Ana, Ph.D. candidate. Conservation Geneticist: genetic diversity of rare or threatened plant species, population genetics, plant systematics, plant ecology.

Cryan, Paul M., Ph.D. candidate. Wildlife Biologist: mammals, bats, biogeography, migration, physiology, GIS.

Ellison, Laura, M.S. Ecologist: bat population ecology, mammals, quantitative biology, modeling, inventory and monitoring.

Farmer, Adrian, Ph.D. Wildlife Biologist: community ecology, habitat modeling, global change, ornithology, stable isotopes and bird migration, bioenergetics.



Godbey, Jerry, M.S. Fish and Wildlife Biologist: radio-telemetry, prairie dog and black-footed ferret behavior and ecology.

Iko, William, M.S. Wildlife Biologist: avian population ecology, wildlife disease, and toxicology; conservation genetics; raptor ecology; stable isotope analysis and food web dynamics.

Knopf, Fritz, Ph.D. Research Wildlife Biologist: biological diversity, avian ecology.

Mohan, Heather, M.S. candidate. Zoologist: avian biology and medicine, animal behavior.

Muths, Erin, Ph.D. Zoologist: declining amphibians, mammalian ecology, inventory and monitoring.

Osborn, Ronald, M.S. Wildlife Biologist: population and community ecology, multimedia and GIS applications, systems development and interface design.

O'Shea, Thomas, Ph.D. Research Wildlife Biologist: mammalogy.

Oyler-McCance, Sara, Ph.D. Conservation Geneticist: population genetics, avian population ecology, modeling, GIS.

Ramotnik, Cindy, M.S. Museum Specialist (Zoology): collection management, mammals, plethodontid salamanders, biological surveys.

Ruth, Janet M., Ph.D. Research Wildlife Biologist: avian ecology, montane riparian birds, grassland birds, bird conservation, Partners In Flight.

Sedgwick, James A., Ph.D. Research Wildlife Biologist: avian ecology, natural history, lifetime reproductive success, costs of cowbird parasitism.

Skagen, Susan K., Ph.D. Research Wildlife Biologist: migration ecology, declining grassland birds, shorebirds, avian ecology.

Stanley, Thomas, Ph.D. Research Wildlife Biologist: quantitative population biology, avian and mammalian ecology, statistical modeling.

Valdez, Ernest, Ph.D. candidate. Wildlife Biologist: mammals, biological survey, systematic collections.

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## CONTACT INFORMATION

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